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SUMMARY OF U.S. TUNA PURSE-SEINE FLEET CHARACTERISTICS AS RELATED TO DOLPHIN MORTALITY IN THE EASTERN TROPICAL PACIFIC OCEAN, 1991-1994

By

Elizabeth F. Edwards

ADMINISTRATIVE REPORT LJ-95-04

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ABSTRACT

The general picture of the U.S. tuna purse-seine fleet in the eastern tropical Pacific Ocean during 1991-1994 shows a fishery in continued decline, but with dramatically improved rates of incidental dolphin mortality. By the end of 1993 only 3 of the remaining 8 vessels in the U.S. fleet were making sets on dolphins but these vessels had achieved mortality rates of less than 0.6 dolphins per set (compared to 4.3 in 1988, and 1.9 in 1991; the rate increased to 1.9 in 1994 due to one disaster set in early February 1994, that subsequently closed the fishery for the remainder of that year). The decrease in fishing effort on dolphins coupled with the dramatic decrease in dolphin kill per set contributed to a decrease in annual dolphin mortality to 106 animals in 1994 (down from 12,922 in 1988 and 891 in 1991). Skippers exceeded performance criteria only twice during 1991-1994 and only at the lowest level of infraction.

This report will likely conclude the series of reports on ETP tuna purse-seine fleet performance related to dolphin mortality because the 1994 quota was reached in February of 1994 due to a single disaster set which accounted for a large fraction (about 40%) of the annual quota. The fishery has been totally closed to dolphin fishing since then. The remaining 3 U.S. vessels that had been dolphin fishing in 1994 have reflagged to other countries. As no U.S. vessel has requested a dolphin mortality limit through the multi-national International Dolphin Conservation Program, it is doubtful at the present that the U.S. will participate further in dolphin fishing in the ETP. Regardless, the permit for U.S. vessels to fish on dolphins is scheduled to expire completely at the end of 1999.

INTRODUCTION

The U.S. tuna purse-seine fleet in the eastern tropical Pacific Ocean has been the source of controversy since the early 1960's for it's practice of capturing large yellowfin tuna by encircling both the tuna and the associated dolphins that frequently serve as the sighting cue for the tuna schools. The extensive dolphin mortality associated with this fishing practice during the 1960's led to fleet performance criteria mandated by the Marine Mammal Protection Act of 1972 (MMPA). Additional amendments in 1988 (Federal Register 1989, 1990) increased the pressure to reduce dolphin mortality and specified that annual reports of fleet performance be produced for the three years 1989, 1990, and 1991 (DeMaster et al. 1992).

Although those reports have been completed and subsequent reports were not required, the present report has been prepared

to provide a continued history of fleet characteristics and performance. The report includes general summaries of fleet size and activities, dolphin mortality information, and skipper performance for the years 1991-1994.

METHODS

Data included in this report were collected by scientific observers from either the National Marine Fisheries Service or the InterAmerican Tropical Tuna Commission. The observers accompanied routine fishing trips to the eastern tropical Pacific Ocean by U.S. tuna purse-seiners during the calendar years 1991-1994 as required by the MMPA. Because all trips were required to carry observers, the data presented are absolute values, not estimates.

Because the size of the fleet was small and decreasing during the study period, relatively few data are available for inspection. Therefore apparent trends are based on very small sample sizes and should be viewed with caution. However, many of the trends observed in this study extend trends evident in previous years and so probably reflect accurately the dynamics of the fishery during the study period 1991-1994.

RESULTS

Fleet Characteristics

The size of the U.S. fleet was quite small in 1991 relative to earlier years when the U.S. fleet dominated the eastern tropical Pacific tuna purse-seine fishery (12 vessels in 1991 vs. 93 in 1981, 29 in 1990[1]). Fleet size decreased even further during 1992 and 1993 (to 8 vessels in 1993 and 1994, Table 1) although size of the international fleet of large (Class 6) seiners responsible for the majority of dolphin mortality remained relatively stable at 100-125 vessels (IATTC Annual Reports 1991, 1992, 1993). No new U.S. vessels entered the U. S. fleet to replace those lost during 1991-1993.

The small U.S. fleet made only 30-40 trips each year during 1991-1994. Trip duration decreased from about 65 days in 1991 to about 40 days in 1993 (Figure 2, down from about 90 days in 1982[2]).

---

[1]Porpoise Rescue Foundation, 2040 Harbor Island Drive, San Diego (619-543-0384), unpublished data summary, 1991.

[2]Porpoise Rescue Foundation, 2040 Harbor Island Drive, San Diego, CA. (619-543-0384). unpublished data summary

Number of skippers also decreased during the period, from 14 in 1991 to 11 in 1994. Only one new skipper entered the fishery each year (Table 1), and 4 skippers left the fleet after 1991, not to return (Figure 1).

Dolphin Mortality

Dolphin fishing activities by the U.S. fleet decreased in concert with the decrease in fleet size and number of skippers. The number of vessels making sets on dolphins decreased from 6 in 1991 to 3 in 1994 (Table 1). Although effort on dolphins relative to schoolfish and logs increased briefly in 1992, in general school and log fishing increased and dolphin fishing decreased during the study period (Figure 3). Dolphin sets per trip decreased from about 30 sets per trip in 1991 and 1992 to about 15 sets per trip in 1993 (Figure 4).

Annual dolphin mortality decreased to 106 animals in 1994, resulting from 55 sets on dolphins during 3 trips by 4 skippers in 1994 (vs 3000 sets and approximately 13,000 killed in 1988/89 and 471 sets with 891 killed in 1991/92, Table 2). Dolphin mortality rate continued to decrease dramatically through 1993, to 0.581 in 1992/93 (from 4.276 in 1988/89 and 1.892 in 1990/91, Table 2). The increase in annual mortality rate during 1994 is misleading, as this rate is largely the result of the one disaster set that closed the fishery early in the year.

Skipper Performance

Skipper performance related to dolphin mortality continued to improve. U.S. skippers exceeded performance criteria only twice during the period 1991-1994, and then only once at the lowest level of infraction during 1991 (Table 3). Number of skippers and trips per skipper per year continued to decrease overall (Figure 5). During 1994, performance criteria were exceeded once, during the single disaster set by a single skipper. This set caused total kill by the U.S. fleet to exceed the annual U.S. quota for incidental dolphin mortality. As a result, U.S. fishermen were prohibited from fishing on dolphins for the remainder of 1994.

DISCUSSION

The general picture of the U.S. tuna purse-seine fleet in the eastern tropical Pacific Ocean during 1991-1993 shows a fishery in continued decline, but with greatly improved rates of incidental dolphin mortality. The decrease in fishing effort on dolphins, coupled with the dramatic decrease in dolphin kill per set was responsible for the significant decrease in total

mortality during the period. However, this dramatic decrease in kill rates, with its concomitant dramatic decrease in mortality quotas, increased the probability that the remaining fishery could be eliminated by a single disaster set, as demonstrated by events during 1994.

This report will likely conclude the series of reports on ETP tuna purse-seine fleet performance related to dolphin mortality because the 1994 quota was reached in February of 1994 due to a single disaster set which accounted for a about 40% of the annual quota (42 of 106 animals). The U.S. fishery has been totally closed to dolphin fishing since then. The remaining 3 U.S. vessels that had been dolphin fishing in 1994 have reflagged to other countries. As no U.S. vessel has requested a dolphin mortality limit through the multi-national International Dolphin Conservation Program, it is doubtful at the present that the U.S. will participate further in dolphin fishing in the ETP. Regardless, the permit for U.S. vessels to fish on dolphins is scheduled to expire completely at the end of 1999.

ACKNOWLEDGEMENTS

Grateful thanks are due to Ken Wallace for his generous help in compiling the data presented here and providing it in readily accessible and understandable form, and to Peter Perkins for preparing the figures.

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Table 1. Fleet characteristics and dolphin-fishing effort by U.S. tuna purse-seine vessels fishing in the eastern tropical Pacific Ocean. Data are for calendar years. Trips are assigned to the year when completed. **Total Trips** is total number of fishing trips ending during a given calendar year. Kill and set data for a given year include all data collected during trips assigned to a given year, including data that were collected on trips that left port prior to January 1 of the assigned year. **Dolphin Trips** is total number of trips during which dolphin sets were made during each calendar year. **Non-dolphin Trips** is the total number of trips during which no dolphin sets were made during each calendar year. **Total Boats** is total number of boats fishing during each calendar year. **New Boats** is number of new vessels entering the U.S. tuna purse-seine fleet each calendar year. Only intentional dolphin sets are included in the calculation of kill per set. The table does not include two 1992 dolphin sets where the known kill is missing (therefore total number of known dolphin sets is 718 in 1992).

	1991	1992	1993	1994	1991-1993
Total Boats	12	7	8	8	12
New Boats	0	0	0	0	0
Total Skippers	14	13	10	11	21
New Skippers	1	1	1	0	3
Returning from Previous Year	13	8	8	10	n/a
Returning from Earlier Year	0	4	1	1	n/a
Total Trips	35	36	40	29	140
Non-Dolphin Trips	23	15	29	26	93
Dolphin Trips	12	21	11	3	47
Skippers Making Sets on Dolphin	7	9	4	4	16
Vessels Making Sets on Dolphin	6	5	3	3	9
Total Sets on Dolphin	360	718	222	55	1355
Total Dolphin Mortality	835	605	120	106	1666
Average Kill per set on dolphin	0.319	0.843	0.541	1.927	n/a

Table 2. Mortality of common dolphins (Delphinus spp.), other dolphins, and all dolphin species combined, due to fishing activities by the U.S. tuna purse seine fleet in the eastern tropical Pacific Ocean during calendar years 1991-1993 in each of three fishing areas as defined by amendments to the U.S. Marine Mammal Protection Act (Federal Register Notice 1989). Mortality calculations were changed from calendar year (Jan. 1-Dec. 31) basis to "fishing year" (Oct. 1 - Sept 30) basis in October 1991 (Federal Register 1991). Data for 1988/89, 1989/90, and 1990/91 are taken from DeMaster et al. (1992). All years are presented as fishing year, to facilitate comparisons.

	Common Dolphin			other dolphin			all dolphin		
	sets	kill	KPS	Sets	Kill	KPS	Sets	Kill	KPS
1988/89									
Area 1	40	837	20.925	1877	5153	2.745	1917	5990	3.125
Area 2	0	0	0.000	780	4818	6.177	780	4818	6.177
Area 3	7	17	2.429	318	2097	6.594	325	2114	6.505
TOTAL	47	854	18.170	2975	12608	4.056	3022	12922	4.276
1989/90									
Area 1	50	470	9.400	1876	2957	1.576	1926	3427	1.779
Area 2	0	0	0.000	393	1547	3.936	393	1547	3.936
Area 3	11	84	7.363	423	2536	5.995	434	2620	6.037
TOTAL	61	554	9.082	2692	7040	2.615	2753	7594	2.758
1990/91									
Area 1	4	3	0.750	282	452	1.603	286	455	1.571
Area 2	0	0	0.000	94	267	2.840	94	267	2.840
Area 3	15	56	3.733	76	113	1.487	91	169	1.857
TOTAL	19	59	3.105	452	832	1.841	471	891	1.892
1991/92									
Area 1	16	76	4.750	502	276	0.550	518	352	0.680
Area 2	0	0	0.000	3	0	0.000	3	0	0.000
Area 3	16	21	1.312	122	315	2.582	138	336	2.435
TOTAL	32	97	3.031	627	591	0.943	659	688	1.044
1992/93									
Area 1	21	40	1.905	192	75	0.391	213	115	0.540
Area 2	0	0	0.000	33	30	0.909	33	30	0.909
Area 3	4	10	2.500	53	20	0.377	57	30	0.526
TOTAL	25	50	2.000	278	125	0.450	303	175	0.578
1993/94									
Area 1	0	0	0.000	3	9	0.290	31	9	0.029
Area 2	0	0	0.000	31	0	0.000	3	0	0.000
Area 3	0	0	0.000	68	101	1.485	68	101	1.485
TOTAL	0	0	0.000	102	111	1.078	102	111	1.078

Table 3. Compliance by skippers in the U.S. tuna purse-seine fleet fishing in the eastern tropical Pacific Ocean during calendar years 1991-1994, with skipper performance limits (dolphin kill per set, KPS) as defined by amendments to the Marine Mammal Protection Act (Federal Register Notice 1990). Data for 1988 - 1990 are taken from DeMaster et. al. (1992).

	> 3.89 KPS					> 26.30 KPS	
	1x	2x	3x	4x	5x	1x	2x
1988	13	0	0	0	0	1	0
1989	14	3	1	0	0	2	0
1990	10	2	1	0	0	0	0
1991	1	0	0	0	0	0	0
1992	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0
1994	1	0	0	0	0	0	0

Figure 1. Trips per vessel for each calendar year 1991-1993 by U.S. tuna purse-seine vessels fishing in the eastern tropical Pacific Ocean. Trips are classified by year in which trip was completed. Each trip includes at least one set, thereby excluding transit trips

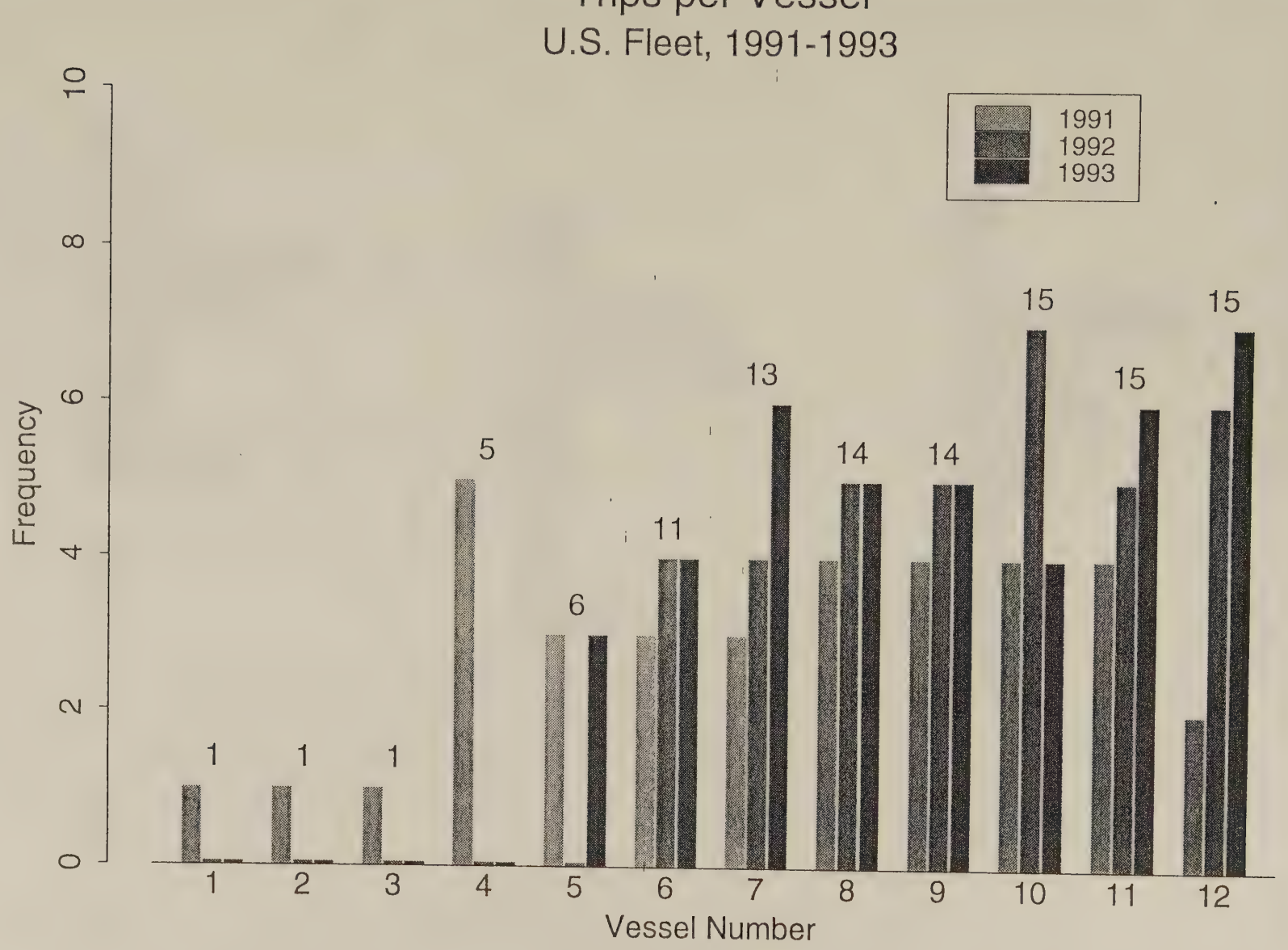

Trips per Vessel
U.S. Fleet, 1991-1993
1991
1992
1993
Frequency
0
2
4
6
8
10
1
1
1
5
6
11
13
14
14
15
15
15
1
2
3
4
5
6
7
8
9
10
11
12
Vessel Number

Figure 2. Trip duration during calendar years 1991-1993 by U.S. tuna purse-seine vessels fishing in the eastern tropical Pacific Ocean.

Trip Length
U.S. Fleet, 1991-1993

Figure 3. Fishing activity for three fishing modes (log, school and dolphin fishing) of U.S. tuna purse-seine vessels fishing in the eastern tropical Pacific Ocean during the calendar years 1991-1993. Trips are classified by year in which trip was completed. Each trip includes at least one set, thereby excluding transit trips.

Sets by Type
U.S. Fleet, 1991-1993

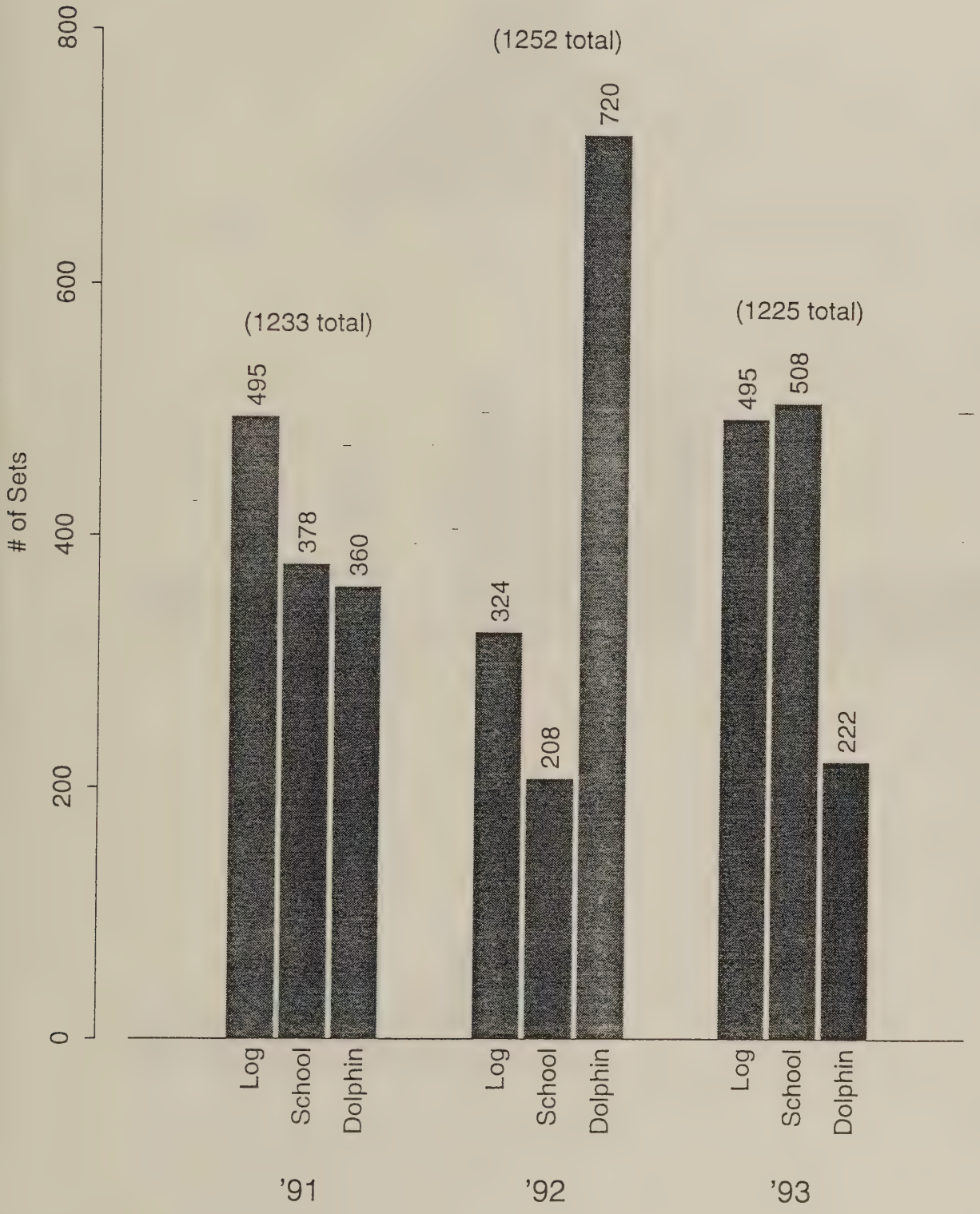
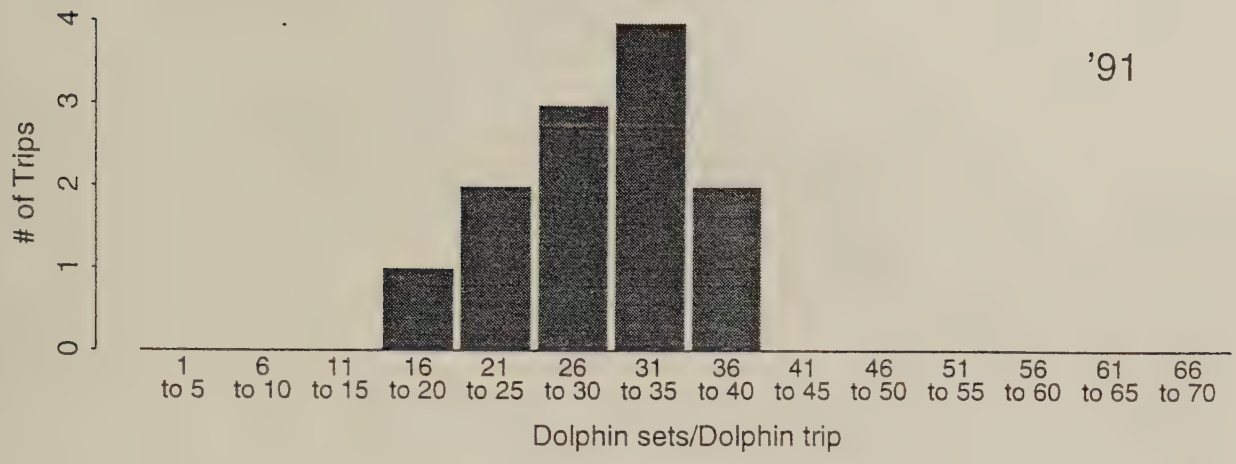
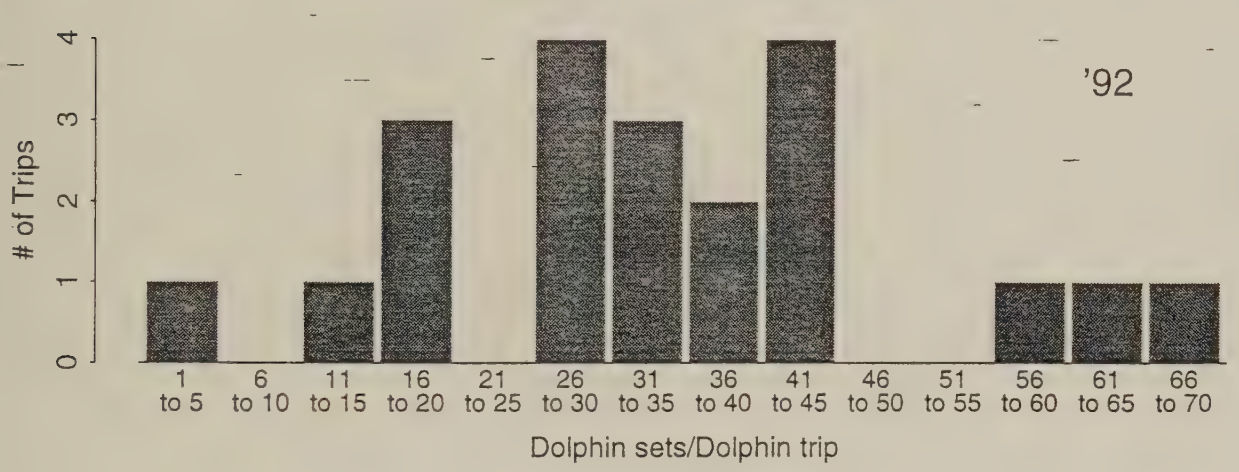


Figure 4. Dolphin sets per trip by U.S. tuna purse-seine vessels fishing in the eastern tropical Pacific Ocean during the calendar years 1991 - 1993. Trips are classified by year in which trip was completed. Each trip includes at least one set, thereby excluding transit trips.

Dolphin Sets per Trip
U.S. Fleet, 1991-1993





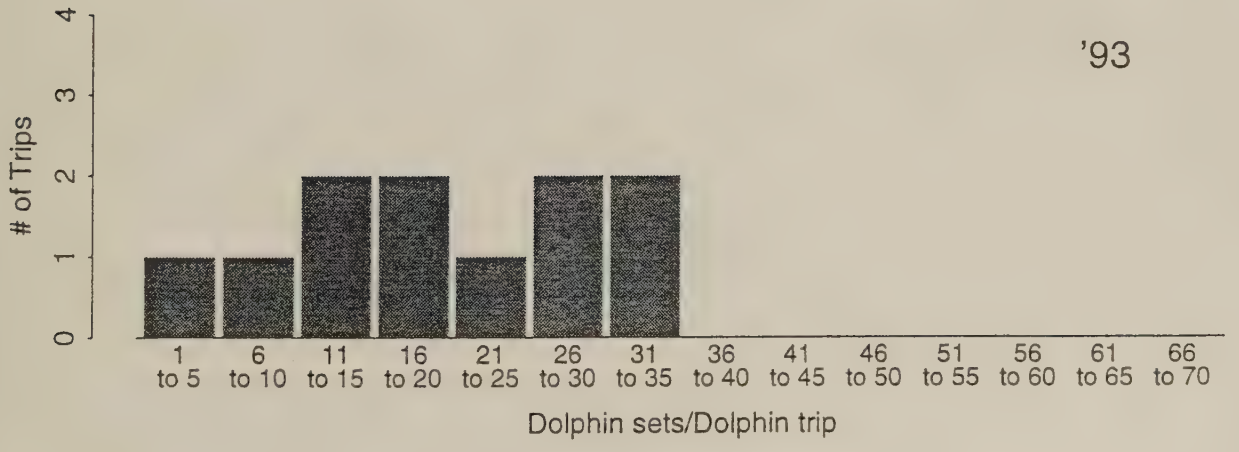


Figure 5. Skipper performance in terms of dolphin kill per set for skippers of the U.S. tuna purse seine fleet fishing in the eastern tropical Pacific Ocean during calendar years 1991-1993.

Skipper Performance
U.S. Fleet